
INTEROFFICE MEMORANDUM

Date: June 10, 2004

To: B. T. Richards MS 3921 6-5060

From: G. E. Tomlinson MS 5209 6-0807

Subject: DOSE ESTIMATES FOR INTEC-603 BASIN ACTIVITIES

Please note these numbers should be considered preliminary based on man-hour estimates provided and projected dose rates.

ESTIMATES BY METHOD:**Leave sludge and debris in place and grout**

<u>Task</u>	<u>Man-hrs</u>	<u>Assumptions</u>	<u>Exposure Rate</u>	<u>Dose Estimate</u>
Water Removal	500	Most work will be done outside of basin near contaminated components	1 mR/hr	0.500 REM
Grouting	1584	Work will take place in basin areas	5 mR/hr	7.920 REM
TOTAL				8.420 REM

Remove sludge and grout all debris in place

<u>Task</u>	<u>Man-hrs</u>	<u>Assumptions</u>	<u>Exposure Rate</u>	<u>Dose Estimate</u>
Remove sludge	5370	Most work will be done in basin areas	5 mr/hr	26.850 REM
Pump water to ICDF	500	Most work will take place outside of basin areas	1 mr/hr	0.500 REM
Grouting	1584	Most work will take place in basin areas	5 mr/hr	7.920 REM
TOTAL				35.270 REM

Remove sludge and all debris and grout

<u>Task</u>	<u>Man-hrs</u>	<u>Assumptions</u>	<u>Exposure Rate</u>	<u>Dose Estimate</u>
Remove sludge & debris	7170	Most work will be done in basin areas	5 mr/hr	35.85 REM
Pump water to ICDF	500	Most work will take place outside of basin areas	1 mr/hr	0.500 REM
Grouting	1584	Most work will take place in basin areas	5 mr/hr	7.920 REM
TOTAL				44.270 REM

Remove sludge/debris, scrub/decontaminate walls, apply fixative, build containment & shielding

<u>Task</u>	<u>Man-hrs</u>	<u>Assumptions</u>	<u>Exposure Rate</u>	<u>Dose Estimate</u>
Sludge & Debris Removal	7170	Basins will be filled with water Workers will be within the basin areas Equipment will have shielding	5 mR/hr	35.850 REM
Basin Containment	4561	Containment to be constructed over water-filled basins Workers will be within basin areas	5mR/hr	22.805 REM

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Install Shielding (if necessary)	1000	4'x 8' carbon steel sheeting used around each basin to height of 4', ½" thick (~1/2 value layer)	5 mR/hr	5.000 REM
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NOTE – spot shielding and/or radiological postings may suffice. An ALARA evaluation will have to be made at a later time when actual conditions are known.

Decon & apply fixative	1300	Using divers – estimated dose rate inferred from overflow pit surveys	10 mR/hr	13.000 REM
Water Removal	500	Most work will be done outside of basin area near contaminated components	1 mR/hr	<u>0.500 REM</u>
Estimate based on original containment at 4561 man-hrs			TOTAL	77.155 REM

Projected dose rates (modeled using Microshield 6.0) at poolside with basins empty of water, post decon and fixative application, with no grout in place can be expected to range from ~15 to 20 millirem/hour. This was calculated based on projected wall dose rates, post drain down, with the exposure coming from the basin floor and three walls.

These estimates have been derived from man-hours provided, average exposure rates when known, exposure received during previous work, and projected dose rates when no survey data exists. For instance basin wall dose rate information has not yet been obtained and schedule constraints prohibited obtaining it in time to include it in this estimate. Dose rate information for all three basins was estimated using a rough average of dose rates seen in the overflow pit which has not yet been decontaminated. Post decontamination (wall scrubbing) dose rates will need to be taken to determine decontamination effectiveness and the effect on below water (wall) dose rates. I am skeptical whether wall decontamination (below the water line) will have significant effect on dose rates based on my past D&D experience with a similar (unlined) concrete walled pool. I do believe dose rates could be significantly reduced adjacent to/above the basins by hydrolazing the bathtub ring/scum line above the water line. Hydrolazing technology is also very effective below the water line and can be employed without sending personnel into the hazardous pool environment, with fewer personnel, and with those personnel working in lower dose rate areas.

Specific tasks, work locations, types of equipment to be used and processes to be employed have yet to be developed in sufficient detail to allow for refined estimates incorporating ALARA dose reduction strategies (minimizing time in radiation fields, maximizing distance from sources of radiation, and use of shielding). Revised estimates will have to be performed after more details emerge. At that time, we can better evaluate the feasibility of implementing targeted dose reduction strategies incorporating engineering and/or administrative controls, as applicable, to various portions of the project.

I would also like to note that “decontamination” of basin walls (below the present water line) and application of fixative may have little beneficial effect unless a comprehensive pool filtration effort is undertaken to remove activity and clarify the water. Otherwise, fixative exposed during pool drain down will be highly contaminated with loose surface contamination and airborne radioactivity will result. I recommend that before a decision on a path forward is made, we better incorporate radiological engineering into the planning process. Before we make a decision costing millions of dollars and expending dozens of man-rem, we should be fairly certain we have the best approach economically and ensure we get the desired end result. To make an informed decision on use of divers, we should first

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evaluate the effectiveness and potential benefits of wall decontamination and fixative application using divers against other methods that might achieve the same end result with less risk and dose. I strongly recommend that any approach begin with efforts to reduce dose rates at poolside, which appear to be coming from the bathtub ring/scum line above water line. All following work would benefit from reduced dose rates regardless of approach implemented afterwards. I believe wall decontamination and fixative application, if necessary, could be performed from above using personnel experienced in reactor cavity or fuel pool decontamination with lower dose expenditure. For instance, even if dose rates are not reduced at poolside man-rem estimates would be performed using 5 mR/hr vs. the 10 mR/hr estimated at ~30 cm. from the walls below the water surface.

If you have any questions, please call at 6-0807.

Respectfully,

A handwritten signature in black ink, appearing to read "Galen Tomlinson for".

Galen Tomlinson

PTS/RE, INTEC

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cc: G. Tomlinson Letter File

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